Mid-Range Plan for Amtrak *Cascades*

Fiscal Year 2010-2017
(Final Report)

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Washington State Department of Transportation

Legislative Mandate

- **Washington State has directed WSDOT to develop a mid-range plan for Amtrak *Cascades* that identifies specific steps to achieve additional service beyond current levels.**
- **ESHB 1094, Section 226, requires WSDOT to submit a mid-range plan to the Office of Financial Management and the transportation committees of the legislature by December 31, 2008.**
- **The mid-range plan fulfills the legislative mandate by identifying and developing options that outline steps to achieve incremental Amtrak *Cascades* services for the next eight years.**

Policy Environment

- **Increasing policy efforts to reduce greenhouse gas emission.**
- **Seeking alternative policies to increase transportation efficiency and relieve highway congestion.**
- **Developing robust and resilient transportation systems.**
- **Rethinking the role of rail systems as a strategic investment for transportation infrastructure.**
- **Competing with needs for limited resources (capital and land).**

Purposes of the Mid-Range Plan Options

- **Provide alternatives needed for policymakers in developing strategic investment policy.**
- **Assess potentials of rail as an alternative investment strategy rather than a niche market segment.**
- **Specify the steps of improving infrastructure to deliver additional intercity passenger service.**
- **Provide information of benefits and costs for informed decision making—legislative budgeting and prioritizing.**

Option 1:
Maintaining the Current Operation

Option 1 has no capital investment for infrastructure improvements in the Mid-Range Plan period.

It maintains current operation levels of Amtrak *Cascades* service. All previous investments in capacity projects are sunk costs without the additional investment to complete the projects.

Option 1 serves as an analytical baseline for the other options.

- **Capital investment: $0**
- **On-time performance: About 61 percent**
- **Capacity: 4 daily round trips between Seattle and Portland**

Option 2: Incremental Strategy – Minimizing Capital Investment

Option 2 achieves a minimal increase of additional service.

It completes four capital projects already underway and sustains capital costs already invested into the system to achieve incremental service gains. The increased service meets demands that would rise due to improved schedule reliability and rail line capacity.

- **Capital investment: $141 million**
- **On-time performance: About 95 percent**
- **Capacity: Gain 1 additional roundtrip, total 5 daily round trips between Seattle and Portland**

Project Group A:

- Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually
- Vancouver – Yard Bypass and W 39th St.
- King Street Station – Track Improvements
- Amtrak *Cascades* Train Sets – Overhaul

Option 3: Incremental Strategy – Matching Supply and Demand

Option 3 achieves additional service by best analyzing and matching supply and demand in a dynamic economy and changing society, achieving additional service levels where the increased supply (Amtrak *Cascades* service capacity) essentially meets the increased demand (forecasted ridership growth).

- **Capital investment: $578 million**
- **On-time performance: About 97 percent**
- **Capacity: Gain 2 additional round trips, total 6 daily round trips between Seattle and Portland**

Project Group A:

- Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually
- Vancouver – Yard Bypass and W 39th St.
- King Street Station – Track Improvements
- Amtrak *Cascades* Train Sets – Overhaul

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Project Group B:

- Increase Capacity of Existing Train Sets
- Kelso-Martin's Bluff – New Siding
- Kelso-Martin's Bluff – Kelso-Longview Jct. – 3rd Main Track
- Amtrak *Cascades* – Two New Train Sets
- Blaine to Vancouver, WA – Main Line Track Upgrade

Option 4: Rail as a Long-Term Alternative – No Financial Constraints

Option 4 maximizes engineering feasibility. This is a viable option in that policy environment rail is promoted as part of the solution toward highway congestion relief, greenhouse gas reduction, public safety improvements, and transportation resilience to disasters. This option includes project groups A, B, and C.

- **Capital investment: $775 million**
- **On-time performance: About 92 percent**
- **Capacity: Gain 4 additional round trips, total 8 daily round trips between Seattle and Portland**

Project Group A:

- Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually
- Vancouver – Yard Bypass and W 39th St.
- King Street Station – Track Improvements
- Amtrak *Cascades* Train Sets – Overhaul

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Project Group B:

- Increase Capacity of Existing Train Sets
- Kelso-Martin's Bluff – New Siding
- Kelso-Martin's Bluff – Kelso-Longview Jct. – 3rd Main Track
- Amtrak *Cascades* – Two New Train Sets
- Blaine to Vancouver, WA – Main Line Track Upgrade

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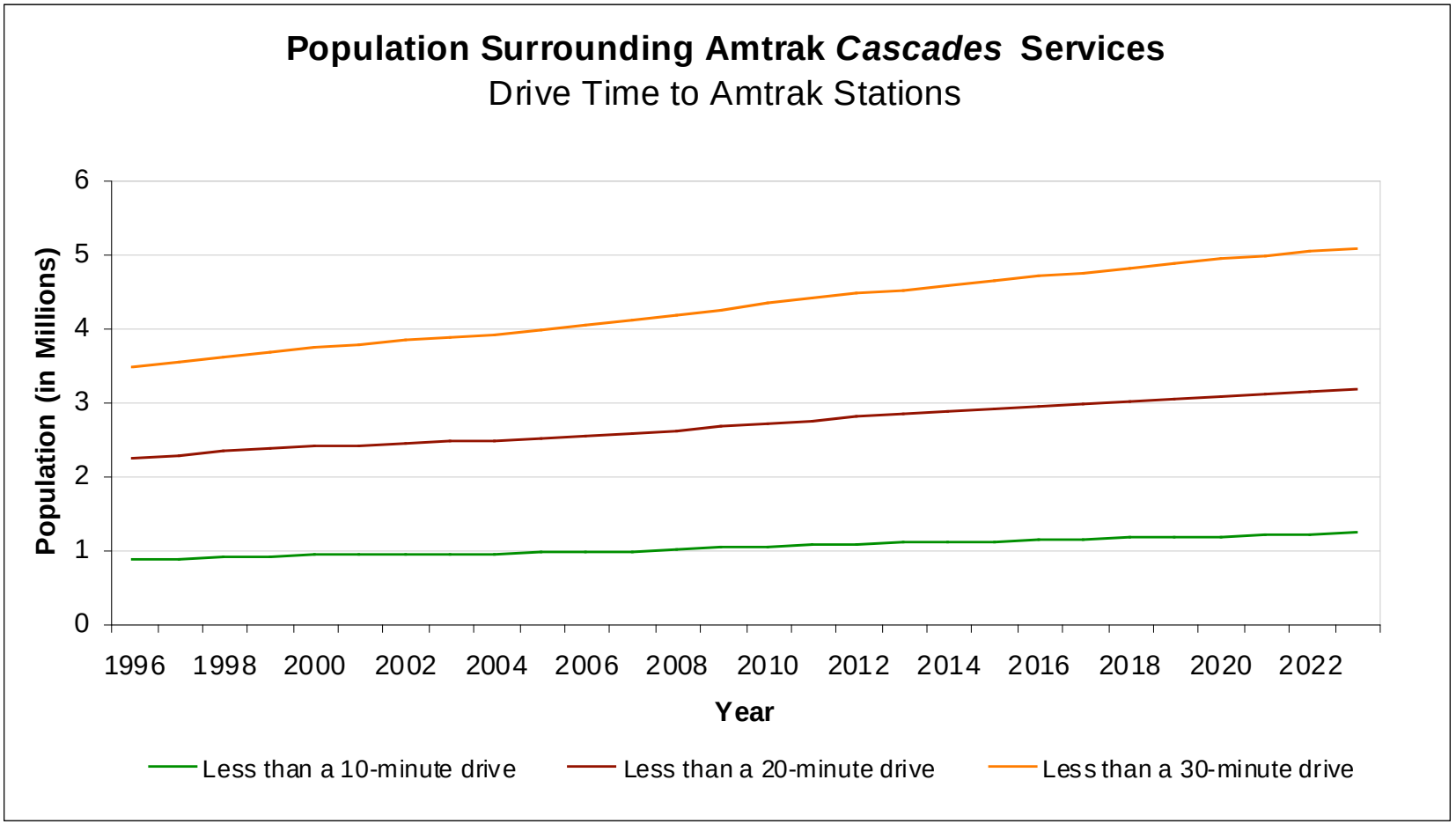
Project Group C:

- Centralia – New Crossover Near China Creek
- Amtrak *Cascades* – Two New Train Sets & Four Locomotives
- Kelso-Martin's Bluff – Kalama 3rd Main Track
- Amtrak *Cascades* – Higher Speed Locomotives
- Tacoma – Reservation to Stewart – New 3rd Main Track

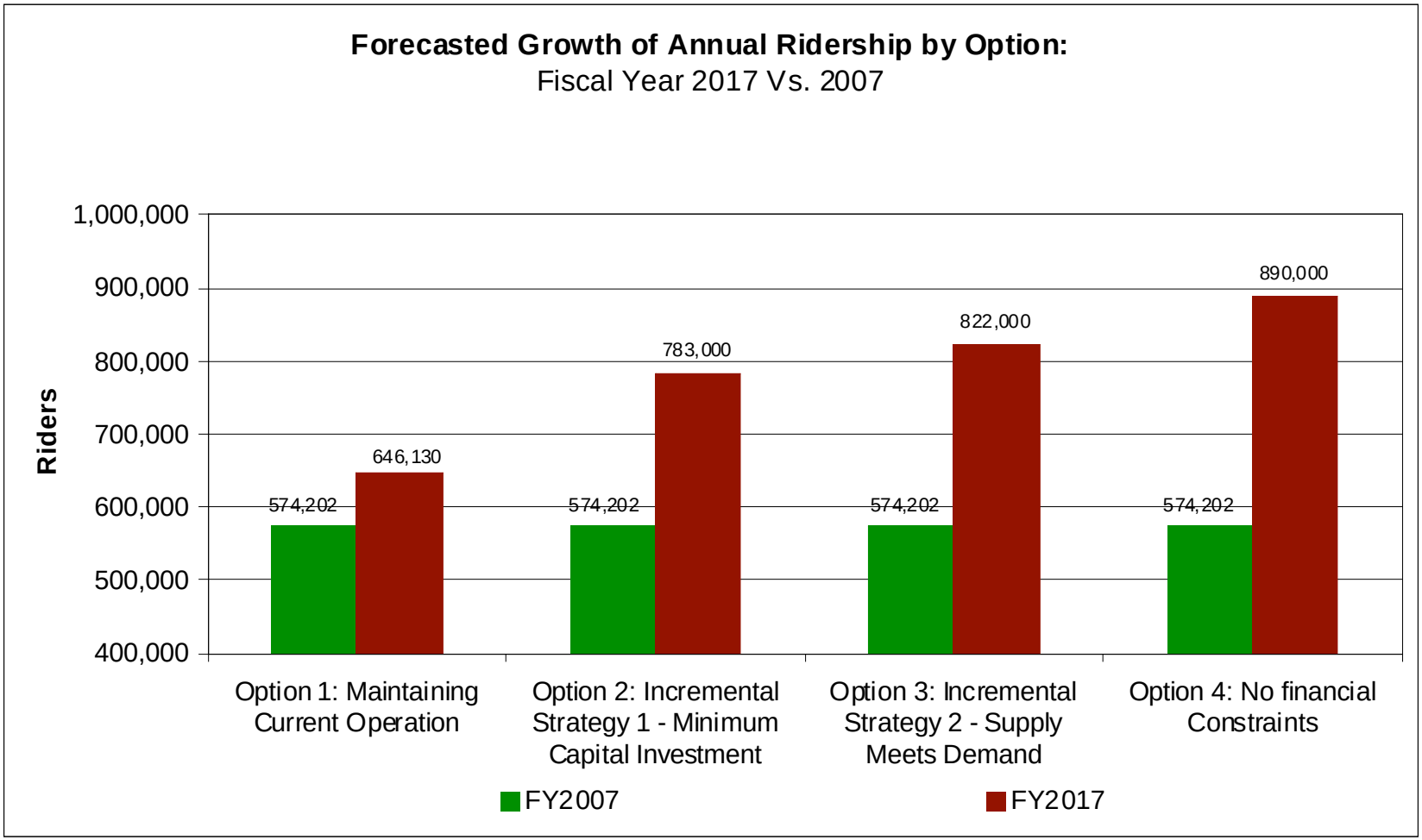
Ridership and Capacity Analysis

- Forecast: Econometric modeling based on history and forecast of key variables:
  - Station populations determined by drive-time GIS mapping and U.S. Census tract data sets
  - Capacity by number of trains and seats
  - Gasoline prices adjusted for Inflation
- Reliability and travel time reduction
  - Travel time reduction
  - Improvement of On-time Performance (Reliability)
- Capacity utilization
  - Current status

Population Growth



Growth of annual ridership by option



Amtrak *Cascades* capacity utilization:

Seattle Portland Route – July 2007 to June 2008*

Amtrak *Cascades* Capacity Utilization* (Seattle Portland Route)

July 2007 to June 2008 (Peak Section**: Between Olympia and Centralia)

	Southbound		Northbound		Total	
	Number	%	Number	%	Number	%
Number of Trains without Seats Available at Peak Section	107	7%	152	10%	259	9%
Number of Trains with Seats Available at Peak Section	1,347	93%	1,304	90%	2,651	91%
Number of Trains in Operation During the Period	1,454	100%	1,456	100%	2,910	100%

* About eight percent of trains in operation were fully occupied during a period between July 2007 to June 2008. This indicates that some riders would not be able to get seats when they needed.

** Peak section is a route segment where a train has highest rider occupancy. For the past ten years, the peak section for Amtrak Cascades is between Olympia and Centralia.

Source: WSDOT Rail and Marine Office

Infrastructure improvement: Capital projects and cost estimates

- **Project Groups:** Project groups are building blocks that combine a number of projects to deliver an incremental service level.

- **Cost Estimates:** Costs are estimated based on the implementation dates of projects for a specific option that is designed for funding considerations

- **Time Savings:** Scheduled time saving is estimated based on infrastructure improvements.

- **On-time Performance Improvement:** On-time performance improvements are estimated using traffic simulation model that incorporates the infrastructure improvements into operations.

Costs of Capital Projects to Acheive Additional Service Level: Fiscal Year 2010 - 2017

Project Group*	Project Name	Year of Completion	Capital Cost Estimates* ($ million)			
			Option 1: $0	Option 2: $141 Million	Option 3: $578 Million	Option 4: $817 Million
Project Group A***: $141M for Options 2, 3, and 4	Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually**	Option 2, 3, and 4: 2012		$141.2	$141.2	$141.2
	Vancouver – Yard Bypass and W 39th St.**					
	King Street Station – Track Improvements**					
	Cascades Train Sets – Overhaul**					
	Five Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 95 percent on-time performance.					
Project Group B: Option 3 $437M; Option 4 $334M	Increase Capacity of Existing Train Sets	Option 3: 2017 Option 4: 2015			$437.1	$334.2
	Kelso-Martin's Bluff – Stage 1 – New Siding					
	Kelso-Martin's Bluff – Stage 2 – Kelso-Longview Jct. – 3rd Main Track					
	Cascades – Two New Train Sets					
	Blaine to Vancouver, WA – Main Line Track Upgrade					
	Six Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 97 percent on-time performance.					
Project Group C: $341M for Option 4	Centralia – New Crossover Near China Creek	Option 4: 2015				$341.4
	Cascades – Two New Train Sets & Four Locomotives					
	Kelso-Martin's Bluff – Stage 3 – Kalama 3rd Main Track					
	Cascades – Higher Speed Locomotives					
	Tacoma – Reservation to Stewart – New 3rd Main Track					
	Eight Seattle to Portland and two Seattle to Vancouver, B.C. daily round trips, 92 percent on-time performance due to running two additional round trips without taking additional expensive reliability projects.					

* A project group is a set of projects or project stages to be implemented collectively to achieve additional service.

** Costs do not include anticipated expenditures prior to July 2009 in 2008 Transportation Supplemental Budget. These projects were currently funded as: Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually, $57.1 million; Vancouver – Yard Bypass and W 39th St., $59.9 million; King Street Station – Track Improvements, $13 million; Cascades Train Sets – Overhaul, $4 million. The cost estimates listed in options are additional costs needed to complete these project starting July 2009.

*** Projects anticipated to be complete prior to July 1, 2009 in the 2008 Transportation Supplemental Budget are not listed.

Scheduled time saving from capacity improvements

- Infrastructure improvements equal more and faster trains
- Changes based on latest BNSF Railway modeling

Between Portland and Seattle			
Project Group*	**Number of Projects**	**Number of Round Trips Than Can Be Operated**	**One-Way Running Time**
Today	--	4	3:30
Project Group A	4	5	3:24
Project Group A and B	4	6	3:20
Project Group A, B, and C	5	8	3:00

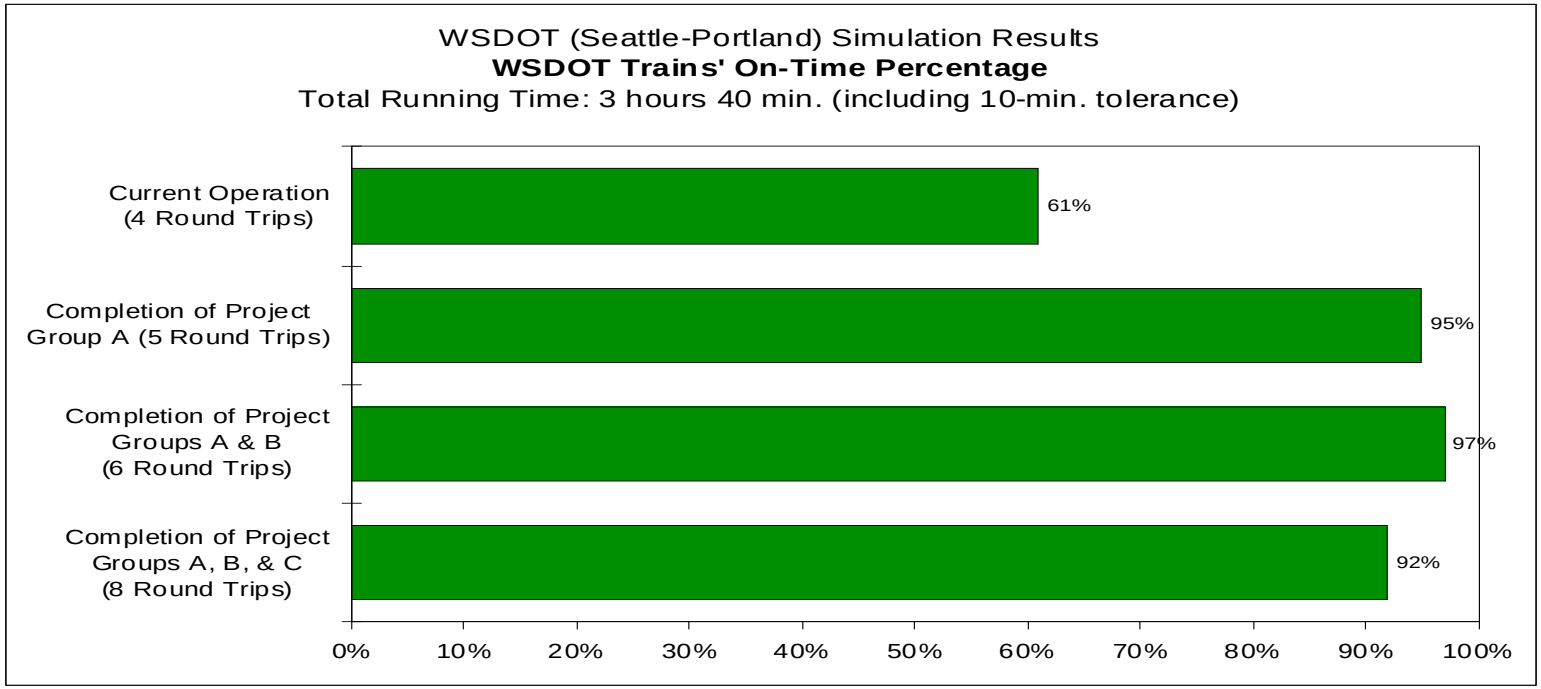
* A project group is a set of projects or project stages to be implemented collectively to achieve additional service.

Group A includes projects "Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually", "Vancouver – Yard Bypass and W 39th St.", "King Street Station – Track Improvements", and "Cascades Train Sets – Overhaul"

Group B includes projects "Kelso-Martin's Bluff – New Siding", "Kelso-Martin's Bluff – Kelso-Longview Jct. – 3rd Main Track", "Cascades – Two New Train Sets", and "Blaine to Vancouver, WA – Main Line Track Upgrade"

Group C includes projects "Centralia – New Crossover Near China Creek', "Cascades – Two New Train Sets & Four Locomotives", "Kelso-Martin's Bluff – Kalama 3rd Main Track". "Cascades – Higher Speed Locomotives", and "Tacoma – Reservation to Stewart – New 3rd Main Track".

Passenger train on-time performance – Simulation results



* On-time performance decreases slightly resulting from the operation of 8 roundtrips. Other projects are available to further improve on-time performance. However, those reliability improvement projects are expensive in terms of the improvements gained by implementing them.

A project group is a set of projects or project stages to be implemented collectively to achieve additional service.

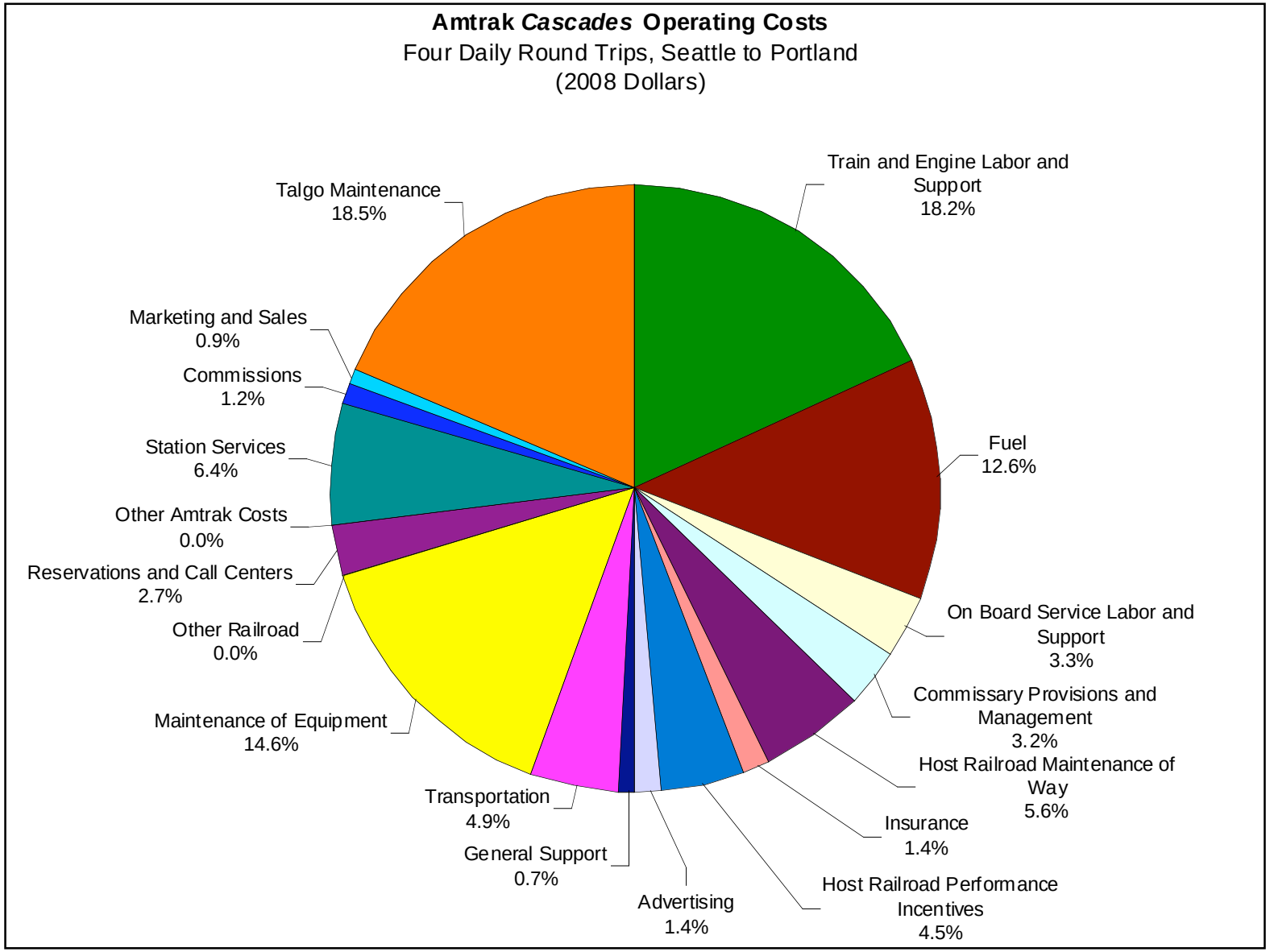
1. Group A includes projects "Tacoma – Bypass of Pt. Defiance – 66th St. to Nisqually", "Vancouver – Yard Bypass and W 39th St.", "King Street Station – Track Improvements", and "Cascades Train Sets – Overhaul"
2. Group B includes projects "Kelso-Martin's Bluff – New Siding", "Kelso-Martin's Bluff – Kelso-Longview Jct. – 3rd Main Track", "Cascades – Two New Train Sets", and "Blaine to Vancouver, WA – Main Line Track Upgrade"
3. Group C includes projects "Centralia – New Crossover Near China Creek', "Cascades – Two New Train Sets & Four Locomotives", "Kelso-Martin's Bluff – Kalama 3rd Main Track". "Cascades – Higher Speed Locomotives", and "Tacoma – Reservation to Stewart – New 3rd Main Track".

Source: The simulations were conducted by Traffic Management Group, Inc. 2008.

Operation Analysis

- Operations simulations were performed in 2007-2008 to review planned infrastructure necessary to support the addition of up to four additional Seattle-Portland round trips. The results validate necessary project elements and their impacts on capacity (number of roundtrips) and reliability (on-time performance).
- Analyzed traffic conditions and growth expectations including Amtrak *Cascades*, Sounder, BNSF Railway, Union Pacific Railroad.
- Analyzed train performance issues that impact reliability and proposed activities that ensure improvement of performance.
- Estimated operating and maintenance costs by options.

Composition of annual operation costs



Estimated annual operation costs:

Between Seattle to Portland

Estimates of Annual Operating Costs and Maintenance Costs for Amtrak *Cascades* Operation (2008 Dollars)						
Daily Round Trips	**Amtrak Operating Cost Per Round Trip**	**Amtrak Operating Cost Per One-Way Trip**	**Talgo Maintenance Cost Per Round Trip**	**Talgo Maintenance Cost Per One-Way Trip**	**Reliability Enhancement Maintenance Cost Per Round Trip**	**Reliability Enhancement Maintenance Cost Per One-Way Trip**
4	$5,753,341	$2,876,671	$913,540	$456,770	$940,125	$470,063
5	$5,499,419	$2,749,710	$899,596	$449,798	$940,125	$470,063
6	$5,293,188	$2,646,594	$890,774	$445,387	$940,125	$470,063
8	$4,997,243	$2,498,622	$873,709	$436,854	$940,125	$470,063
Include operating costs, Talgo maintenance costs, maintenance costs enhancing reliability, and Amtrak administrative costs. Estimated based on historical data, Amtrak FFY2009 Cost Estimates, and planned activities. The cost estimates reflect economy of scale. As more round trips are operated, the cost to operate each round trip is reduced.						
Source: WSDOT State Rail and Marine Office						

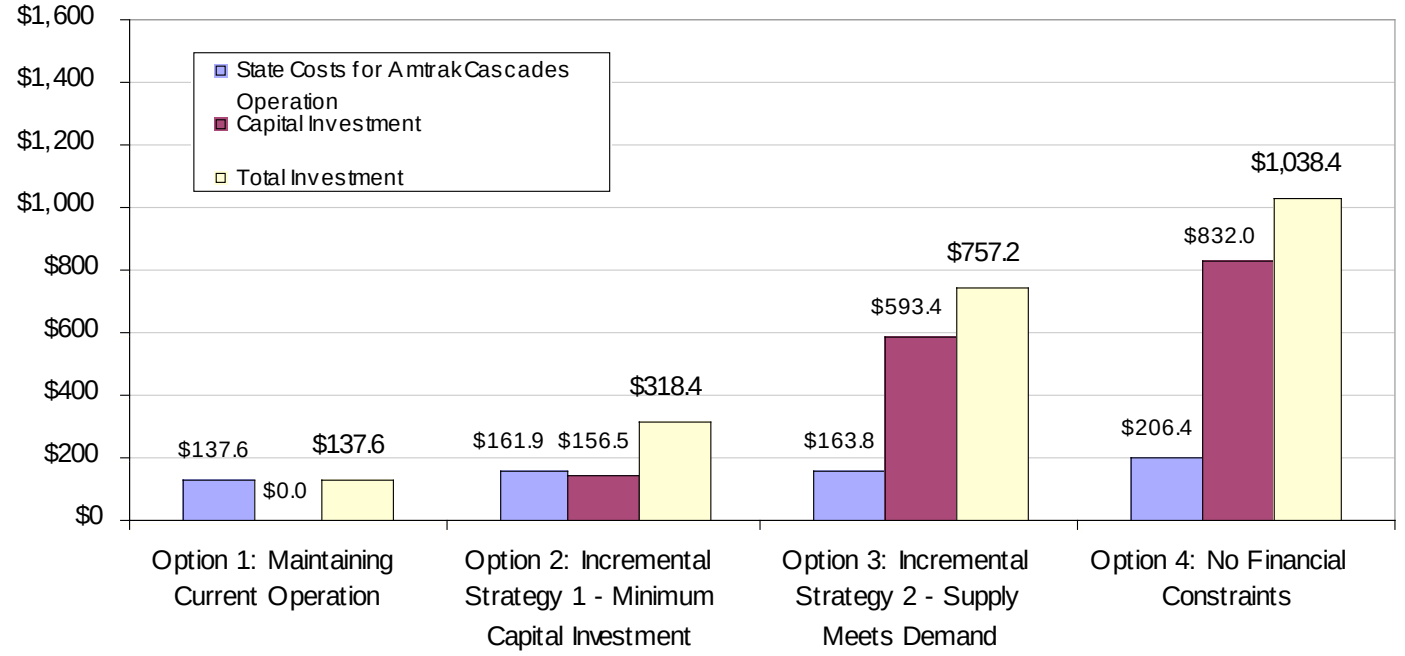
Estimated costs to Washington state

Total Operation Cost, Revenue, and Net State Costs for Amtrak *Cascades* Operation Sum of FY 2010-2017 ($ Millions)			
Plan Options	**Operating Costs***	**Revenue****	**Net State Costs for Amtrak Cascades Operation*****
Option 1: Maintaining Current Operation	$235.7	$118.4	$117.3
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$360.2	$144.4	$215.8
Option 3: Incremental Strategy 2 - Supply Meets Demand	$366.7	$153.0	$213.8
Option 4: No Financial Constraints	$428.2	$157.2	$270.9
* Include operating costs, Talgo maintenance costs, maintenance costs enhancing reliability, and Amtrak administrative costs. Estimated based on historical data, Amtrak FFY2009 Cost Estimates, and planned activities.			
** Include revenues from tickets and passenger services. Estimated based on historical revenue data assuming price neutral policy. Total revenue is the product of total forecasted passenger miles and revenue earned per passenger mile, adjusted for inflation.			
*** This is the estimated costs Washington State pays for contracted Amtrak *Cascades* operation.			
**** The sixth round trip starts in FY2017, the total operation cost here for Option 3 does not show full effect of the operation at the capacity built.			
Source: WSDOT State Rail and Marine Office			

Investment, Benefits, and Impacts

- Investment
- Economic impacts of investment
- Benefit Assessment & Benefit/Cost Analysis
  - Economic Benefits
    - Revenue
    - Value added
  - Societal benefits
    - Congestion relief
    - Safety improvement
    - Environmental impact reduction
  - Net Benefit and Benefit/Cost Ratio
- Cross modal comparison

Total investment: FY 2010 to 2017



Operation costs include Amtrak operating costs, Talgo maintenance costs, maintenance costs enhancing reliability, and Amtrak administrative costs. Estimated based on historical data, Amtrak FFY 2009 Cost Estimates, and planned activities.

Capital investments are estimated costs to implement a new project or complete the elements of an existing project.

The cost estimates are adjusted for inflation using rail specific PPI component indices published by Bureau of Labor Statistics and WSDOT standard cost inflation indices.

Economic impacts by option

The projects completed during the mid-range plan period of fiscal year 2010 to 2017 will generate benefits for local communities and Washington State for many years beyond 2016. Economic impacts are evaluated through fiscal year 2024. Both benefits and costs are discounted to present value (2008 dollars) using a standard economic method for comparison.

Economic Impacts of Amtrak *Cascades* Midrange Plan Options:

Sum of Fiscal Year 2010 to 2030*

Impact	Area	Option 1: Maintaining Current Operation	Option 2: Incremental Strategy 1 - Minimum Capital Investment	Option 3: Incremental Strategy 2 - Supply Meets Demand	Option 4: No Financial Constraints
Support Employment (Job-Year**)	Benefits to Local Communities Along I-5 Corridor	4,887	11,725	17,454	23,752
	Statewide Benefits (Include benefits to local communities)	6,202	15,024	22,825	31,138
Value Added*** ($ Million, 2008 Dollars)	Benefits to Local Communities Along I-5 Corridor	$306.5	$746.8	$1,139.9	$1,555.1
	Statewide Benefits (Include benefits to local communities)	$399.7	$977.6	$1,500.6	$2,048.1

Note: Economic impacts are assessed using IMPLAN Input-Output model for Washington State and its local areas.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017.

** A job-year means that a person is employed as a full-time employee for a year.

*** Difference between the total sales revenue of an industry and the total cost of components, materials, and services purchased from other firms within a reporting period (usually one year). It is the industry's contribution to the gross domestic product (GDP).

Source: WSDOT State Rail and Marine Office

Benefit and cost by option

The projects completed during the mid-range plan period of fiscal year 2010 to 2017 will generate benefits for local communities and Washington state for many years beyond fiscal year 2017. Benefits and costs are evaluated through year 2023. Both benefits and costs are discounted to present value (2008 dollars) using a standard economic method for comparison.

Estimated Benefit Cost Ratio by Investment Option

Plan Option	Sum of FY2010 to FY2030* - $ Million (2008 Dollars)			
	Total Cost ($ Million)**	**Total Benefit** ($ Million)**	**Net Benefit ($ Million)**	**B/C Ratio**
Option 1: Maintaining Current Operation	$310	$625	$315	**2.02**
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$733	$1,853	$1,120	**2.53**
Option 3: Incremental Strategy 2 - Supply Meets Demand	$1,129	$2,744	$1,615	**2.43**
Option 4: No Financial Constraints	$1,536	$3,400	$1,864	**2.21**

Note: Option 1 is the baseline.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017. Benefits are sum of FY2010 to FY2030.

** Operation costs are sums of FY2010 to FY2030. Capital investment is sum of FY2010 to FY2017. Both benefits and costs are discounted to present value (2008 dollars).

Source: WSDOT State Rail and Marine Office

Return for incremental investment by option

The projects completed during the mid-range plan period of fiscal year 2010 to 2017 will generate benefits for local communities and Washington State for many years beyond 2016. Benefits and costs are evaluated through fiscal year 2024. Both benefits and costs are discounted to present value (2008 dollars) using a standard economic method for comparison.

Incremental Benefit Cost by Investment Options			
Plan Option	**Sum of FY2010 to FY2030 - $ Million (2008 Dollars)**		
	Incremental Investment**	**Incremental Benefit**	**Incremental Investment B/C Ratio**
Option 1: Maintaining Current Operation	**Baseline**	**Baseline**	**Baseline**
Option 2: Incremental Strategy 1 - Minimum Capital Investment	$423	$1,228	2.90
Option 3: Incremental Strategy 2 - Supply Meets Demand	$819	$2,119	2.59
Option 4: No Financial Constraints	$1,226	$2,775	2.26

Note: Option 1 is the baseline.

* The projects completed during the mid-range plan period of FY2010 to FY2017 will generate benefits for local communities and Washington State for many years beyond FY2017. Benefits are sum of FY2010 to FY2030.

** Operation costs are sums of FY2010 to FY2030. Capital investment is sum of FY2010 to FY2017. Both benefits and costs are discounted to present value (2008 dollars).

Cross Modal Analysis

Transportation cost include visible and invisible costs to travelers. The following chart, based on an analysis on different types of costs associated with three transportation modes, provides a comparison of transportation cost to society.

Esitmated Transportation Cost by Mode ($/Passenger Mile)				
Year	**Cost Type**	**Rail**	**Highway/Motor Vehicle**	**Air**
2008	User Costs*	$0.20	$0.55	$1.12
	System Utilization Costs**	$0.26	$0.06	$0.06
	Environmental Costs	$0.05	$0.11	$0.05
	Safety Costs	$0.00	$0.06	$0.00
	Other Costs***	N/A	N/A	N/A
	Total Costs	**$0.51**	**$0.78**	**$1.23**

* User costs: Rail user costs are the ticket price based on historical operations data. Highway user costs are car depreciation, insurance, fuel, and car maintenance. Special user taxes and fees paid by users such as motor fuel tax and license fees are excluded from highway user costs to avoid double counting.

** System utilization costs: Rail systems are mostly funded by public investments (subsidies besides what is recovered from service revenue). Highway systems are mostly funded by specific user taxes, such as motor fuel taxes and vehicle license fees.

*** Cost such as flexibility is not assessed because lack of data.

Connectivity

Multimodal Connections

- Sound Transit: Light Rail, Sounder, Express Bus
- Washington State Ferries
- Amtrak Thruway motorcoach
- Intercity Transit (public, private)
- Air travel
- Car sharing
- Bicycle
- Taxi
- Cruise ships

Improvements

- Integrated fares
- Travel packages
- Integrated schedules
- Passenger information systems
- Signage
- Parking/Bicycle Storage

Marketing

Focus Areas

- Promoting achievements in ridership and revenue targets.
- Strong brand awareness.
- Amtrak *Cascades* differentiated from other transportation modes.
- Depending on the mid-range plan option, Amtrak *Cascades* positioned as a viable alternative method of intercity travel.
- Depending on the mid-range plan option, Amtrak *Cascades* as viable option for business travel in the I-5 corridor.

Marketing

1999-2006	2007-2009	2010-2017
▪ Advertising and promotion targeted Adults 25-54 ▪ Advertising budget = $1M - $1.3M ▪ Ridership 452,334 in 1999 to 629,996 in 2006 ▪ Advertising focused on brand awareness	▪ Advertising and promotion targeted Female Adults & Adults 25-54 ▪ Advertising budget = $1M - $1.3M ▪ Ridership 676,760 in 2007 ▪ Ridership breaking records in 2008 ▪ Advertising focused on brand building and promoting alternative travel to car/air	▪ Advertising and promotion targeted to Adults 25-54; business travelers ▪ Advertising budget based on ridership, depending on the mid-range plan option ▪ Ridership growth opportunities: * business travel * alternative travel * enviro-marketing * promoting ease and comfort of train travel

Important things to consider when planning for passenger rail

- Mobility (reducing congestion in I-5 corridor, Sea-Tac Airport).
- Reliability (increasing business riders).
- Environmental impacts (reducing environmental impacts).
- Safety (improved passenger safety).
- Support tourism.

Intercity Passenger Rail: Opportunity and challenges

Opportunities

- High fuel cost and green house gas reduction (leading to fast growth of ridership—double digit growth this year).
- Improvement in reliability (capital investment will increase on-time performance from 60+% to 90+%).
- Reduction in travel time (options reduce travel time from 4 to 30 minutes).

Challenges

- Dedicated federal funding source does not exist.
- Statewide multi-modal funding will be limited.
- Oregon capital funding and Canadian investment are uncertain.

Questions?

For more information on Mid-Range Plan for Amtrak *Cascades,* please contact:

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Washington State Department of Transportation